Patent Claims

1. An immunoglobulin molecule or a fragment thereof deriving from a parental anti-idiotype anti-CEA antibody and comprising constant regions from human origin and synthetically designed variable regions comprising one or more sequence tracts of more than 4 consecutive amino acid residues deriving from human tumour antigen CEA (carcinoembryonic antigen).

2. An immunoglobulin molecule according to claim 1, wherein one of said sequence tracts comprises 5 – 20 consecutive amino acid residues.

3. An immunoglobulin molecule according to claim 1 or 2, wherein at least one of said sequence tracts is a component of a complementarity determining region (CDR) of the heavy and / or light chain of said immunoglobulin or overlaps with adjacent residues of a framework region adjacent to said CDR.

4. An immunoglobulin molecule of claim 3, wherein said component forms 30 to 100% of the amino acid residues of said CDR.

5. An immunoglobulin molecule according to claim 3 or 4, wherein said CDR is a CDR of the heavy chain of said immunoglobulin.

6. An immunoglobulin molecule according claim 3, wherein at least two CDRs of each heavy and / or light chain consist completely of CEA-derived sequence tracts.

7. An immunoglobulin molecule according to any of the claims 1 to 6, wherein said parental anti-idiotype antibody is mouse antibody 708.

8. An immunoglobulin molecule according to any of the claims 1 to 7, comprising within the variable regions additionally sequence tracts of 5 to 25 consecutive amino acid residues deriving from human CD55 antigen or the hypervariable regions of an anti-idotype anti-CD55 antibody.

9. An immunoglobulin molecule of claim 8, wherein said anti-idotype anti-CD55 antibody is mouse antibody 105AD7.

10. An immunoglobulin molecule according to any of the claims 1 to 9, wherein within the variable regions additionally potential MHC class II epitopes, which do not contribute to an immune response to CEA positive human cancer cells, have been removed by amino acid substitutions.

11. An immunoglobulin molecule according to any of the claims 1 to 10, comprising within the variable regions additionally CEA derived sequence tracts which are MHC class I epitopes.

12. An immunoglobulin molecule according to claim 11, wherein said CEA-derived sequence tracts are TLLSVTRNDV and YLSGANLNL.

13. An immunoglobulin molecule of claim 11 or 12, wherein said CEA derived sequence tracts are part of or form completely one ore more of the CDRs of the light chain of said immunoglobulin.

14. An immunoglobulin molecule according to any of the claims 1 to 12, comprising within the variable regions additionally CEA derived sequence tracts which are MHC class II epitopes contribute to an immune response directed to CEA positive human cancer cells.

15. An immunoglobulin molecule according to any of the claims 1 to 13, comprising a variable heavy chain selected from any of the sequences as depicted in Figures 4 to 7.

16. An immunoglobulin molecule according to any of the claims 1 to 13, comprising a variable light chain selected from any of the sequences as depicted in Figures 8 and 9.

17. An immunoglobulin molecule according to any of the claims 1 to 13, comprising a heavy chain selected from any of the sequences as depicted in

Figures 4 to 7 and a light chain selected from any of the sequences as depicted in Figures 8 and 9.

18. An immunoglobulin molecule according to any of the claims 1 to 11, wherein the variable heavy and / or light chain comprises one or more sequence tracts in identity with the sequence tracts selected from the group:
    (i) 345-354 of human CEA;
    (ii) 387-396 of human CEA
    (iii) 571-579 of human CEA
    (iv) 629-645 of human CEA
    (v) 148-167 of human CD55

19. A pharmaceutical composition comprising an immunoglobulin molecule of any of the claims 1 to 18 in an biologically effective amount, an adjuvant, and optionally a pharmaceutically acceptable carrier, diluent or excipient.

20. Use of an immunoglobulin molecule or a pharmaceutical composition of any of the above-specified claims for the manufacture of a medicament for vaccination of a human individual suffering from a CEA positive solid or metastasising tumour.

21. Use of claim 20, wherein said vaccination causes improved stimulation of CD8 and / or CD4 positive T-cells in said individual.

22. A method for the production of a vaccine molecule based on a synthetically designed immunoglobulin molecule suitable for the treatment of a human individual suffering from a CEA (carcinoembryonic antigen) positive solid or metastasising tumour, said method comprising the following steps:
    (i) selecting a non-human anti-idiotype anti-CEA antibody,
    (ii) replacing the non-human constant regions by a human constant regions, and
    (iii) replacing partially or completely one or more of the hypervariable regions (CDRs), with sequence tracts deriving from CEA, whereby framework residues adjacent to said CDRs may be included.

23. A method of claim 22, comprising additionally one or more of the steps selected from the group:
(iv) replacing sequence tracts within the variable regions with tracts deriving from CD55 antigen or the hypervariable regions of an anti-idiotype anti-CD55 antibody,
(v) replacing sequence tracts within the variable regions with tracts which are MHC class I and / or MHC class II epitopes responding to CEA positive human cancer cells,
(vi) removing within the variable regions potential MHC class II epitopes, which do not contribute to an immune response to CEA positive human cancer cells.

24. A method of claim 22 or 23, wherein said non-human anti-idiotype anti-CEA antibody is mouse antibody 708.